Exploration Contribution	Science Questions	RFA 2003	Objectives / Investigations	Measurements	Observed Region	Spacecraft Location	New Instruments	Technology Development
Solar system analogue for extra-terrestrial planets.	How do solar irradiance, solar wind and their variability control the environments of the Earth, Moon, Mars, other planets comets and other bodies in the solar system?	3c	Understand the variability of solar irradiance.	Spectral irradiance	Photosphere-Corona	Earth, Heliosphere	GMM, MG2, HEUV	S/N increase by 10-100 over GOLF; lightweight, solar sails?
				Total irradiance	Photosphere-Corona	Heliosphere	HTSI	light wieght < 4kg, solar sails?
				Spatial dependence	Photosphere-Corona	Earth	HTUVS, HTEUVS, HRNBI	Gratings, active pixel sensors; Image stabilization
		1f	Understand how the Sun and solar wind control planetary environments.	Solar wind plasma magnetic field	Heliosphere	Planetary orbits		
				Magnetospheres Upper atmosphere structure				
Comparative Astrospheres	What is the nature of the boundary region with the interstellar medium?	1d	Understand the interaction of the solar wind with the Interstellar Medium (ISM): interstellar gas, ENAs, and pick up ions.	Energetic particles	Heliosphere Boundary Region	1-5AU, in and out of ecliptic	energetic particle analyzer	
				ENAs remote sensing	Heliosphere Boundary Region	>1AU, in and out of ecliptic	ENA-L,M,H Imagers	
				pick up ions	Heliosphere Boundary Region	1-4AU, in and out of ecliptic	pickup ion analyzer	
				Solar wind plasma magnetic field	Heliosphere Boundary Region	1-4AU, in and out of ecliptic	vector magnetometer; plasma analyzer	
				Interstellar neutrals	Heliosphere Boundary Region	1-4AU, in and out of ecliptic	ENA-L analyzer	IMAGE, IBEX phaseA
				Solar EUV input to Heliosphere	Heliosphere	Heliosphere	HEUV	light wieght, solar sails?
				Solar wind EUV emission	Heliosphere Boundary Region	1-4AU, in and out of ecliptic	DEUS	low intrinsic noise MCPs; diffraction
				Interstellar EUV glow	Heliosphere Boundary Region	1>AU, in and out of ecliptic	DEUS	low intrinsic noise MCPs; diffraction
				Interplanetary and interstellar dust	Heliosphere Boundary Region	0.3-5AU, in and out of ecliptic	Dust analyzer	
				Radio Emissions	Heliosphere Boundary Region	>10AU, in and out of ecliptic	Radio	
				Energetic particles	In situ Boundary Region	100-200AU	energetic particle analyzer	
				ENAs remote sensing	In situ Boundary Region	100-200AU	ENA-L,M,H Imager	IMAGE, IBEX phaseA, Cassini
				pick up ions	In situ Boundary Region	100-200AU	pickup ion analyzer	
				Solar wind plasma magnetic field	In situ Boundary Region	100-200AU	vector magnetometer; plasma analyzer	
				Interstellar neutrals	In situ Boundary Region	100-200AU	ENA-L analyzer	IMAGE, IBEX phaseA
				Interstellar EUV glow	In situ Boundary Region	100-200AU	DEUS	low intrinsic noise MCPs; diffraction
				Interplanetary and interstellar dust	In situ Boundary Region	100-200AU	Dust analyzer	
				Radio Emissions	In situ Boundary Region	100-200AU	Radio	
			Solar inputs to	Out of ecliptic	Heliosphere	Heliosphere, out of	HEUV	Improved spectrographic
Long-term Forecast of Envelopes of Solar Activity (for, e.g., Exploration design and planning)	How are magnetic fields created and how do they evolve?	1a	Understand the generation and transport of magnetic fields in the solar interior.	Flows and oscillations	Solar Interior / photosphere	Earth		
		2a	Understand the interaction of convection, flows, rotation and magnetic field as they couple into the dynamo	Internal and surface flows in relation to magnetic patterns	Solar interior / photosphere	Earth		
					Stellar surface	Sun-Earth Libration Point 2	SI	formation flying, micro-thrusters, metrology, wave-front control
				Magnetic Field or proxy (UV/optical imaging)	Solar surface	Earth		
					Stellar atmosphere	Sun-Earth Libration Point 2	SI	formation flying, micro-thrusters, metrology, wave-front control
	How do we predict mid-term solar activity and the evolution of solar disturbances as they propagate into the heliosphere and affect Earth	3a,f	Develop a model for the solar dynamo based on solar and stellar observations	Surface patterns of emerging and dispersing magnetic field	Solar photo-sphere	Earth		
					Stellar surfaces on Sun-like stars	Sun-Earth Libration Point 2	SI	formation flying, micro-thrusters, metrology, wave-front control
		3b	Learn how surface fields and flows interact to shape the heliospheric field on long time scales	Patterns of field and surface flows over long periods	Solar photosphere	Earth		
					Stellar surfaces	Sun-Earth Libration Point 2	SI	formation flying, micro-thrusters, metrology, wave-front control
				Global heliospheric field	Heliospheric field and solar wind	Heliosphere	Particle	